

## REMARKS/ARGUMENTS

Claims 18-38 are active in the case. Reconsideration is respectfully requested.

The present invention relates to a process of preparing aqueous dispersions.

### Claim Amendment

The amendment to Claim 18 of a particle size range of 150 to 250 nm for the size of the product particles is supported by the specification at page 10 , lines 23 - 26 of the specification. Accordingly, the amendment to the claims does not introduce new matter into the case. Entry of the same is respectfully requested.

### Claim Rejection, 35 USC 103

Claims 18-31 and 34-38 stand rejected based on 35 USC 103(a) as obvious over Hofmann, U. S. Patent 4,180,529 in view of Takarabe et al, U. S. Patent 4,914,142 and De Witt, U. S. Patent 4,173,596. This ground of rejection is respectfully traversed.

The Hofmann '529 patent discloses a multi-layered graft acrylic polymer that is comprised of an elastomeric core formed of cross-linked acrylate, a non-elastomeric, relatively hard second layer of a cross-linked methacrylate polymer, wherein the methacrylate monomer may be copolymerized with optionally another monoethylenically unsaturated monomer, a third layer of elastomeric polymerized alkyl acrylate with optionally another monoethylenically unsaturated monomer, and a fourth layer non-elastomeric, relatively hard alkyl methacrylate polymer, wherein the methacrylate monomer is optionally copolymerized with another monoethylenically unsaturated monomer. The first stage of the process of the reference is the preparation of an acrylate polymer which functions as a seed material, and therefore corresponds to the seed latex starting material of the present process. Note, however, that whereas the seed latex is comprised of particles that have a size ranging from 3

to 20 nm, which is a fraction of the particle size range of 150 to 250 nm of the final product of layer forming polymerization reactions, the Hofmann patent only discloses a layered polymer product in which the particles range in size from 150 to 350 nm. There is no disclosure in Hofmann of a polymer seed material that is constituted of latex seed particles of any required size, and certainly no disclosure of the presently claimed range of 3 to 20 nm. Moreover, although the particle size range of the polymer particles of the present product overlaps the stated range of 150 to 350 nm of the patent, the two size ranges are different. Accordingly, the patent does not suggest either the present process or product as claimed.

The Takarabe et al patent does not overcome the deficiencies of Hofmann, and, in fact, is believed not to be germane to either the process disclosed in Hofmann or the present process. Nowhere does the reference teach or suggest a process of forming a core-shell, multilayer (meth)acrylate polymer, wherein the core stage of the multilayer polymer is formed in the presence of a seed latex. Rather, Takarabe et al discloses a method of producing an emulsion polymer by adding a polymerizable unsaturated monomer to an emulsion polymer comprised of a high mol wt. compound that does not contain a polyfunctional cross-linkable monomer or a chain transfer agent and which has a  $M_w$  mol wt. of 20,000 to 2,000,000 as a seed polymer. The monomer that is employed for polymerization is selected from a broad group of types as disclosed in columns 4 and 5 of the patent. The predominant polymerizable monomer disclosed in the examples is styrene. There is no teaching or suggestion of forming a multi-layered polymer material from almost exclusively (meth)acrylate monomers as in the present process. Suitable such polymers for the emulsion polymer include copolymers of  $\alpha,\beta$ -ethylenically unsaturated monomers, which preferably exclude carboxyl group containing monomers, polyesters and polyurethanes (col 2, lines 61-64). The polymerization of the monomer is conducted in the presence of a film-forming aid which is a compound such as ethylene glycol, which facilitates absorption of the unsaturated

monomer in the seed particles and swelling of the seed particles, and which makes it easy to form particles of a highly monodisperse emulsion polymer. Clearly, the Takarabe et al patent contains no disclosure that overcomes or improves upon the deficiencies of Hofmann with respect to the present invention. Withdrawal of the reference is requested.

The cited De Witt patent discloses an impact modifier for use with rigid polymer materials such as PVC. The process of preparation of the impact modifier as described in column 3 requires the preparation of an initial polymer seed latex of a partially cross-linked acrylate such that the seed particles that are formed have a particle size range of 20 to 200 nm. The process subsequently requires the formation of a second layer which is elastomeric (rubbery) and is comprised of polybutadiene or a copolymer of butadiene and acrylate monomer. Thus, the product after the second stage of polymerization is an elastomeric polymer layer about a core of seed polymer, the two layers being chemically distinct from one another (col 3, lines 22-33). Finally, a third layer is formed on the outer elastomer layer of dispersed polymer particles. The third or outer polymer layer is formed from acrylate ester of  $\alpha$ -substituted monoolefin (col 5, lines 25-30). It is therefore clear that the three layer process of De Witt is not consistent with the layering process of Hofmann, particularly with respect to the seed latex which is made of a hard cross-linked acrylate polymer, whereas the seed latex of the first stage of Hofmann is an elastomeric (resilient) acrylate polymer, so it is not clear how the two references can be combined suggest the layered structure of the present polymer dispersion, whereby a first or core layer is formed on a (meth)acrylate based polymer seed latex or on an aqueous emulsion of a long chain alcohol, followed by the polymerization of (meth)acrylate monomer in the presence of a cross-linking agent to form an intermediate polymer layer and finally an outer hard (meth)acrylate polymer layer. Clearly, the methodology described in the De Witt patent is quite different from that

disclosed in Hofmann patent so that it is difficult to properly combine the two disclosures.

Withdrawal of the rejection is respectfully requested.

Claims 18-26, 29-31 and 34-38 stand rejected based on 35 USC 103(a) as obvious over Owens et al., U. S. Patent 3,793,402 in view of Takarabe et al., U. S. Patent 4,914,142 and De Witt, U. S. Patent 4,173,596. This ground of rejection is respectfully traversed.

The Owens patent discloses an impact resistant thermoformable composition that is said to have improved stress whitening characteristics. The composition is based on poly(meth)acrylates which is comprised of 90 to 4 % by wt of a multi-stage core-shell particle with a hard core, an elastomeric first shell and a hard second shell. A typical constituency of the core and the second shell requires (lower)alkyl methacrylates. The first shell is formed on the hard core polymer material by the copolymerization of 50 to 99.9 wt % of butadiene, substituted butadiene and an alkyl acrylate (col 7, lines 3- 25), and preferably contains from 10 to 25 wt % of styrene. Other components that are present are a cross-linker and a graftlinker. However, the process of producing the multi-layer polymer particles of the patent does not require the preparation and presence of a seed latex which is necessary in the present invention prior to conducting the first stage of (meth)acrylate polymerization in the presence of a crosslinking monomer to form the polymer core. Rather, in Owens a first stage of polymerization is conducted to form a polymer core without a seed latex being present. Accordingly, from the very start of the polymerization of core monomers, the present process is fundamentally different from the staged monomer polymerization of Owens, even though the patent discloses a first emulsion stage of polymerization of methacrylate polymerization to form a hard core, a second stage of an elastomeric polymer formed possibly from an alkyl acrylate and a third stage of a rigid polymethacrylate. Clearly, the Owens patent does not suggest the core/shell structure of the polymer prepared by the presently claimed process.

The Takarabe et al patent is irrelevant to the process disclosed in Owens, as well as the present process, for the reasons stated above. The patent discloses a method of producing an emulsion polymer by adding a polymerizable unsaturated monomer to an emulsion polymer comprised of a high mol wt. compound, and then conducting polymerization in the presence of a film-forming aid. The Takarabe et al patent contains no disclosure that overcomes or improves upon the deficiencies of Owens with respect to the present invention.

The cited De Witt patent discloses an impact modifier for use with rigid polymer materials such as PVC. The process of preparation of the impact modifier as described in column 3 requires the preparation of an initial polymer seed latex of a partially cross-linked acrylate such that the elastomeric seed particles that are formed have a particle size range of 20 to 200 nm, which is a particle size range above that of the latex particles of the seed of the present process. Moreover, the process of Owens does not require polymerization of monomers in a first stage in order to form a seed latex. The combination of DeWitt with Owens does not suggest the present process or product and withdrawal of the rejection is respectfully requested.

The Examiner states on page 6, lines 2-5 of the Office Action that the *final product obtained by the process of Owens in [the] presence of seed latex particles and the alkyl alcohol of Takarabe et al is a core-shell particle since the polymerization is conducted in multiple stages*. This statement is believed to be inaccurate, because the thermoplastic material of Owens is not prepared from a process in which a seed latex is used as the starting aqueous medium. Further, the Takarabe et al reference does not disclose core/shell polymer particles prepared in multiple stages. Rather, it describes the production of an emulsion polymer by adding a polymerizable unsaturated monomer to an emulsion polymer comprised of a high mol wt. compound that does not contain a polyfunctional cross-linkable monomer or a chain transfer agent and which has a  $M_w$  mol wt. of 20,000 to 2,000,000 as a seed

polymer. Suitable such polymers for the emulsion polymer include copolymers of  $\alpha,\beta$ -ethylenically unsaturated monomers, polyesters and polyurethanes. The polymerization of the monomer is then subsequently conducted in the presence of a film-forming aid which is a compound such as ethylene glycol. No core/shell polymer product is described.

Claim 32 stands rejected based on 35 USC 103(a) as obvious over Owens in view of Takarabe et al and De Witt and further in view of Falk et al, U. S. Patent 4,542,179. This ground of rejection is respectfully traversed.

The subject matter of Claim 32 is directed to a secondary aspect of the invention upon which patentability of the invention does not depend. Moreover, as has been demonstrated above, the multi-layered polymer product produced by the present process is not the same as the layered polymer products of Owens and De Witt, and even if an acrylonitrile/styrene copolymer was added to the multi-layered polymer products of Owens or De Witt, a product polymer mixture like that of present Claim 32 would be produced. Accordingly, it is believed that the cited combination of references suggest the present invention and withdrawal of the rejection is respectfully requested.

Claim 33 stands rejected based on 35 USC 103(a) as obvious over Hofmann in view of Takarabe et al and De Witt and further in view of Shah et al, U. S. Patent 5,777,034. This ground of rejection is respectfully traversed.

The subject matter of Claim 33 is directed to a secondary aspect of the invention upon which patentability of the invention does not depend. The combined prior art does not suggest the multi-layered polymer material of the present invention, so that modification of a polymer derived from Hofmann in a blend as taught by Shah et al would not result in the product of present Claim 33. Withdrawal of the rejection is respectfully requested.

Claim 33 stands rejected based on 35 USC 103(a) as obvious over Owens in view of Takarabe et al and De Witt and further in view of Shah et al, U. S. Patent 5,777,034. This ground of rejection is respectfully traversed.

The subject matter of Claim 33 is directed to a secondary aspect of the invention upon which patentability of the invention does not depend as stated above. Moreover, the primary reference relied upon in the rejection, as seen from the discussion above concerning Owens, does not suggest the multi-layered product produced by the present process. Accordingly, the combined prior art does not suggest the multi-layered polymer material of the present invention. Withdrawal of the rejection is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon

Customer Number  
**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 06/04)

  
\_\_\_\_\_  
Frederick D. Vastine, Ph.D.  
Registration No. 27,013

NFO:FDV